SLIM Unit Outline 2

**Unit on:** Alegbraic Thinking

**Overarching questions**

* How can I identify, describe, and extend patterns?
* How can I represent my thinking clearly and accurately in multiple ways?
* Where do I see patterns, rules, and functions in the real world?

**Topical questions**

* What is equivalence? Why does it matter?
* How can I use number lines, T-charts, expressions, and words to learn *and* to show my learning?
* How does coordinate graphing work? What kind of information can I put into a coordinate graph *and* learn from a coordinate graph?
* How can I represent real world growth patterns?

**Standards addressed:**

*NCTM content standards*

* Describe, extend, and make generalizations about geometric and numeric patterns;
* Represent and analyze patterns and functions, using words, tables, and graphs.

*NCTM process standards*

* Problem solving:
  + monitor and reflect on the process of mathematical problem solving
* Communication
  + Use the language of mathematics to express mathematical ideas precisely
* Representation
  + Select, apply, and translate among mathematical representations to solve problems

*RIDE GLES*

* M(F&A)–5–1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) representedin models, tables, sequences, or in problem situations; and writes a rule in words orsc symbols for finding specific cases of a linear relationship. (State)
* M(F&A)–5–2 **Demonstrates conceptual understanding of linear relationships** (*y* = *kx*) **as a constant rate of change** by identifying, describing, or comparing situations that represent constant rates of change (e.g., tell a story given a line graph about a trip). (Local)

**PHASE I: Finishing the Frog-Jumping Contest**

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| **#** | **Lesson Title** | **Objective** | **Activities** | **Materials** | **Assessment** |
| Pre-assessment: Learn more about how students represent mathematical thinking through representations activity. | | | | | |
| 1 | The Fence | Students will continue using the concepts of equivalence and develop methods of representation/record-keeping. | Students will consider how many possible arrangements of six- and eight-foot fence sections are needed to enclose a 52 x 66 ft area. | Appendix F record sheet (with enlarged rectangle on back), cubes for some students, SmartBoard slides | Collect worksheets, record shares on SmartBoard |
| 2 | The Combination Chart and Exchanges | Students will reconsider yesterdays work and collectively tackle the issue of representing all the possibilities in a more general problem. | Creating posters, gallery walk, Math Congress | Poster paper and colored pencils, SmartBoard or chartpaper to create combo/exchange chart | Review posters |
| 3 | The Frog-Jumping Contest | Students will use their understanding of equivalency (and, perhaps, unknowns) to find which frog had the longest jump | Students will use the information in Appendix G to create representations—visual and/or numeric—of the three frogs’ jumps and steps and use this information to solve the problem. | Appendix G, drawing paper | Collect work at the end of the day |
| 4 | The Frog-Jumping Contest (Day 2) | Students will finalize and share their work from the previous day, the Math Congress will focus on equivalency | Students will complete posters and have a gallery walk, during the Math Congress students will be invited to share who have particularly illustrative drawings | Poster paper, colored pencils | Review posters |
| 5 | The Olympics | Students will use unknowns on the number line to solve problems. | Students will apply the idea of unknowns on the number line to solving a number of problems from the Frogs’ “Olympics.” | Appendices J, K, and L, SmartBoard for number line mini lesson | Collect work |
| 6 | More Olympics | In the Math Congress, students will create a list of strategies that can be used to solve similar problems | Students will complete the previous day’s work, create posters, and have a gallery walk in preparation for a Math Congress. | Poster paper and colored pencils, SmartBoard to record suggestions | Review posters |
| Summative assessment: Students will individually complete the assessment provided by the unit designers. It is suggested that students complete this work in *pen* in order to capture all of their mathematical thinking. | | | | | |

**BEND IN THE ROAD: Guess My Rule**

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| **#** | **Lesson Title** | **Objective** | **Activities** | **Materials** | **Assessment** |
| Pre-assessment: Identifying, describing, and extending patterns activity | | | | | |
| 7 | What is an in/out table? | Students will learn use a T-chart to record/represent information *and* to learn from T-charts | Mini-lesson on T-charts, workshop practice crafting in/out tables, extending in/out tables, and describing the patterns seen in T-charts | worksheet |  |
| 8 | Guess my rule Day 1 | Students will learn to guess/decipher a rule from information in a T-chart | Playing guess my rule whole class | Notebooks, chart/SmartBoard with examples | Conference Question: How is this problem similar to problems we have done before? |
| 9 | Guess my rule Day 2 | Students will begin to play guess my rule with symbols/variables instead of numerical values | Playing guess my rule whole class | Notebooks, chart/SmartBoard with examples | Conference Question: What have you already tried? What do you need to do next? |
| 10 | Guess my rule Day 3 | Students will apply the previous day’s learning by inventing their own “rules” and corresponding charts. | Students will play guess my rule in partnerships or trios. | Notebooks, SmartBoard to record example rules/charts |  |
| Self-assessment: Students will help create a rubric and assess their work in partnerships (including their work as rule-inventors, rule-guessers, and team-members). | | | | | |

**BEND IN THE ROAD:** **Exploring Coordinate Graphing**

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| **#** | **Lesson Title** | **Objective** | **Activities** | **Materials** | **Assessment** |
| 11 | The Fly on the Ceiling: A Math Myth | Students will begin to explore coordinate plotting in the context of the story. | Playing tic-tac-toe in partnerships | Book, graph paper | Conference Question: Have you developed a strategy? |
| 12 | Groundworks lesson |  |  |  |  |
| 13 | Groundworks lesson |  |  |  |  |
| 14 | Groundworks lesson |  |  |  |  |
| 15 | Groundworks lesson |  |  |  |  |
| Writing about math assessment: Students will use one of their own invented rules and T-charts to create a graph, then write directions (procedural text?) explaining how to transfer information from a T-chart to a coordinate graph. | | | | | |

**BEND IN THE ROAD: Things That Come in Groups**

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| **#** | **Lesson Title** | **Objective** | **Activities** | **Materials** | **Assessment** |
| 16 | Things come in groups Day 1 | Students will identify groups in the real world, developing material for the next day’s work. | Students will brainstorm things that come in groups (of 1, 2, 3, 4…) and then create T-charts for some of these | SmartBoard slides for brainstorms | Conference Question: Is there more than one possible correct answer? Why/why not? |
| 17 | Things come in groups Day 2 | Students will use T-charts to create graphs. | Students will graph some of the T-charts created on the previous day. These charts will be used for analysis during the share. | Materials from previous day, notebooks | Conference Question: In your own words, what do you have to do today? |
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**BEND IN THE ROAD: Investigating Growth Patterns**

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| **#** | **Lesson Title** | **Objective** | **Activities** | **Materials** | **Assessment** |
| 18 | Growing Caterpillars Day 1 | Students will gain familiarity with growth patterns. | Clap-snap activity, building models of the caterpillar in years 1-5, recording information in pictures and a chart. | Tiles, notebooks | Conference Question: How is this similar to problems we have looked at before? How is it different? |
| 19 | Growing Caterpillars Day 2 | Students will add graphing to their collection of representations of the caterpillar’s growth | Graphing from T-charts. |  |  |
| 20 | Growing Caterpillars Day 3 | Students will finalize work and create posters displaying their knowledge of the caterpillars growth pattern. | Students will complete a poster showing an expression, T-chart, graph, and written language to describe the caterpillars. Students will then have a gallery walk. |  | Review posters. |
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**BEND IN THE ROAD: Linear Functions/Non-linear Functions**

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| **#** | **Lesson Title** | **Objective** | **Activities** | **Materials** | **Assessment** |
| 20 | Five Dog Night Day 1 |  |  |  |  |
| 21 | Five Dog Night Day 2 |  |  |  |  |
| 22 | Minnie’s Diner Day 1 |  |  |  |  |
| 23 | Minnie’s Diner Day 2 |  |  |  |  |
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**BEND IN THE ROAD: Order of Operations**

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| **#** | **Lesson Title** | **Objective** | **Activities** | **Materials** | **Assessment** |
| 24 | Four strikes and you’re out Day 1 |  |  |  |  |
| 25 | Four strikes and you’re out Day 2 |  |  |  |  |
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